

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A cleaning solution comprising from about 10% to about 35% by weight of hydrogen fluoride (HF), from about 10% to about 35% by weight of ammonium fluoride (NH₄F) and from about 30% to about 80% by weight of de-ionized water (H₂O) based on a total amount of the cleaning solution, and wherein the percent by weight (wt%) of the hydrogen fluoride (HF) exceeds that of the ammonium fluoride (NH₄F).

Claim 2 (currently amended): A method of cleaning a ~~semiconductor~~ substrate, comprising:

providing a substrate having a top surface, a bottom surface and a bevel portion constituting a side edge extending between said top and bottom surfaces, and a layer comprising a nitride that extends over said top surface and onto said bevel portion;

preparing a cleaning solution comprising from about 10% to about 35% by weight of hydrogen fluoride (HF), from about 10% to about 35% by weight of ammonium fluoride (NH₄F) and from about 30% to about 80% by weight of de-ionized water (H₂O) based on a total amount of the cleaning solution, and wherein the

percent by weight (wt%) of the hydrogen fluoride (HF) exceeds that of the ammonium fluoride (NH₄F);

selectively exposing the bevel portion of the substrate to the cleaning solution to thereby remove the layer from the bevel portion while leaving the layer on the top surface;

subsequently rinsing the substrate of cleaning solution remaining on the semiconductor substrate; and

subsequently drying the substrate.

Claim 3 (currently amended): The method of cleaning a ~~semiconductor~~ substrate of claim 2, further comprising maintaining the temperature of the cleaning solution in a range of from about 15°C to about 35°C while the cleaning solution is removing the layer from the bevel portion.

Claim 4 (currently amended): The method of cleaning a ~~semiconductor~~ substrate of claim 2, wherein said exposing comprises spraying the cleaning solution toward the bevel portion of the substrate through a nozzle.

Claim 5 (currently amended): The method of cleaning a ~~semiconductor~~ substrate of claim 2, wherein the layer includes a nitride layer.

Claim 6 (currently amended): The method of cleaning a ~~semiconductor~~ substrate of claim 2, wherein the layer comprises an oxide layer, and a nitride layer disposed on the oxide layer.

Claim 7 (currently amended): The method of cleaning a ~~semiconductor~~ substrate of claim 2, wherein the layer comprises a nitride layer, and an oxide layer disposed on the oxide layer.

Claim 8 (currently amended): A method of cleaning a ~~semiconductor~~ substrate comprising:

providing a substrate having a top surface, a bottom surface and a bevel portion constituting a side edge extending between said top and bottom surfaces, and a layer comprising a nitride that extends over said top surface and onto said bottom portion;

preparing a cleaning solution comprising from about 10% to about 35% by weight of hydrogen fluoride (HF), from about 10% to about 35% by weight of ammonium fluoride (NH₄F) and from about 30% to about 80% by weight of de-ionized water (H₂O) based on a total amount of the cleaning solution, and wherein the percent by weight (wt%) of the hydrogen fluoride (HF) exceeds that of the ammonium fluoride (NH₄F);

removing the layer from the bottom portion of the substrate by dipping the substrate into the cleaning solution;

subsequently rinsing the substrate of cleaning solution remaining on the semiconductor substrate; and
subsequently drying the substrate.

Claim 9 (currently amended): The method of cleaning a ~~semiconductor~~ substrate of claim 8, further comprising maintaining the temperature of the cleaning solution in a range of from about 15°C to about 35°C while the cleaning solution is removing the layer from the bottom portion.

Claim 10 (currently amended): The method of cleaning a ~~semiconductor~~ substrate of claim 8, wherein one of a nitride layer, a composite layer of an oxide layer/nitride layer and a composite layer of a nitride layer/oxide layer is formed on the ~~semiconductor~~ substrate, and a photoresist film is formed on the substrate.

Claim 11 (currently amended): The method of cleaning a ~~semiconductor~~ substrate of claim 8, wherein the layer includes of a nitride layer.

Claim 12 (currently amended): The method of cleaning a ~~semiconductor~~ substrate of claim 8, wherein the layer comprises an oxide layer, and a nitride layer disposed on the oxide layer.

Claim 13 (currently amended): The method of cleaning a ~~semiconductor~~ substrate of claim 8, wherein the layer comprises a nitride layer, and an oxide layer disposed on the oxide layer.

Claim 14 (currently amended): A method of cleaning a substrate comprising:

providing a substrate having a top surface, and a nitride layer that extends over said top surface;

preparing a cleaning solution comprising from about 10% to about 35% by weight of hydrogen fluoride (HF), from about 10% to about 35% by weight of ammonium fluoride (NH_4F) and from about 30% to 80% by weight of de-ionized water (H_2O) based on a total amount of the cleaning solution, and wherein the percent by weight (wt%) of the hydrogen fluoride (HF) exceeds that of the ammonium fluoride (NH_4F);

removing the nitride layer from the substrate without damaging the layer underlying the nitride layer, by dipping the substrate into the cleaning solution;

subsequently rinsing the substrate of cleaning solution remaining on the ~~semiconductor~~ substrate; and

subsequently drying the substrate.

Claim 15 (currently amended): The method of cleaning a substrate of claim 14, further comprising maintaining the temperature of the cleaning solution in a range of

from about 15°C to about 35°C while the cleaning solution is removing the nitride layer.

Claim 16 (original): The method of cleaning a substrate of claim 15, wherein said removing constitutes a Decap process for regenerating the substrate.

Claim 17 (currently amended): A method for use in the manufacturing of semiconductor devices, comprising:

providing a control substrate;

forming a nitride layer a plurality of times on the control substrate;

determining a characteristic of the nitride layer after each time ~~a said~~ one of the nitride layer layers is formed on the control substrate;

regenerating the substrate between respective ones of the plurality of times in which the nitride layers are formed on the substrate by

preparing a cleaning solution comprising from about 10% to about 35% by weight of hydrogen fluoride (HF), from about 10% to about 35% by weight of ammonium fluoride (NH₄F) and from about 30% to about 80% by weight of de-ionized water (H₂O) based on a total amount of the cleaning solution, and wherein the percent by weight (wt%) of the hydrogen fluoride (HF) exceeds that of the ammonium fluoride (NH₄F), and

removing the nitride layer from the substrate by dipping the substrate into the cleaning solution.

Claim 18 (new): The cleaning solution of claim 1, wherein the ratio of the wt% of the hydrogen fluoride (HF) to the ammonium fluoride (NH_4F) to the de-ionized water (H_2O) is 25:10:65.

Claim 19 (new): The cleaning solution of claim 1, wherein the ratio of the wt% of the hydrogen fluoride (HF) to the ammonium fluoride (NH_4F) to the de-ionized water (H_2O) is 25:20:55.

Claim 20 (new): The method of cleaning a substrate of claim 2, wherein the cleaning solution is prepared such that the ratio of the wt% of the hydrogen fluoride (HF) to the ammonium fluoride (NH_4F) to the de-ionized water (H_2O) is 25:10:65.

Claim 21 (new): The method of cleaning a substrate of claim 2, wherein the cleaning solution is prepared such that the ratio of the wt% of the hydrogen fluoride (HF) to the ammonium fluoride (NH_4F) to the de-ionized water (H_2O) is 25:20:55.

Claim 22 (new): The method of cleaning a substrate of claim 8, wherein the cleaning solution is prepared such that the ratio of the wt% of the hydrogen fluoride (HF) to the ammonium fluoride (NH_4F) to the de-ionized water (H_2O) is 25:10:65.

Claim 23 (new): The method of cleaning a substrate of claim 8, wherein the cleaning solution is prepared such that the ratio of the wt% of the hydrogen fluoride (HF) to the ammonium fluoride (NH_4F) to the de-ionized water (H_2O) is 25:20:55.

Claim 24 (new): The method of cleaning a substrate of claim 14, wherein the cleaning solution is prepared such that the ratio of the wt% of the hydrogen fluoride (HF) to the ammonium fluoride (NH_4F) to the de-ionized water (H_2O) is 25:10:65.

Claim 25 (new): The method of cleaning a substrate of claim 14, wherein the cleaning solution is prepared such that the ratio of the wt% of the hydrogen fluoride (HF) to the ammonium fluoride (NH_4F) to the de-ionized water (H_2O) is 25:20:55.

Claim 26 (new): The method of claim 17, wherein the cleaning solution is prepared such that the ratio of the wt% of the hydrogen fluoride (HF) to the ammonium fluoride (NH_4F) to the de-ionized water (H_2O) is 25:10:65.

Claim 27 (new): The method of claim 17, wherein the cleaning solution is prepared such that the ratio of the wt% of the hydrogen fluoride (HF) to the ammonium fluoride (NH_4F) to the de-ionized water (H_2O) is 25:20:55.